V

A NEW GENUS OF OTTER FROM THE PLIOCENE OF THE NORTHERN GREAT BASIN PROVINCE

By Eustace L. Furlong

With two plates

[Reprinted from Carnegie Institution of Washington Publication No. 418. 1932]

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CONTENTS

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INTRODUCTION

Systematic collecting over a number of years in the Thousand Creek beds of northwestern Nevada has furnished one of the largest and best-known mammalian faunas from the Pliocene of the Great Basin province. Among the carnivores recorded in the assemblage are several mustelid forms. To this list is now added a representative of the Lutrinæ, based on material secured by the California Institute of Technology in the Thousand Creek beds during the field season of 1929.

The discovery of this material has led to the recognition of a related type in the Rattlesnake Pliocene fauna of the John Day region, Oregon. Thus, added information becomes available concerning the relationships of the Thousand Creek and Rattlesnake faunas.

Mustelid types are not uncommon in later Tertiary faunas of western America, but it is noteworthy that forms having a direct ancestral relationship to the modern otters are wholly lacking in the record or are but doubtfully established. The present material from the middle and earlier Pliocene aids in extending backward the history of the lutrine division of the Mustelidæ, at least to this stage in the Tertiary.

ACKNOWLEDGMENTS

The writer is indebted to Dr. Chester Stock for interest in the present study and for his criticism of the manuscript. Recent otter skulls were made available by Mr. Donald R. Dickey of the California Institute of Technology. Loan of fossil material from the Rattlesnake Pliocene was kindly granted by Dr. Charles L. Camp of the Paleontological Museum, University of California. Mr. John L. Ridgway made the drawings, retouched the photographs and assembled the plates.

LUTRINÆ

Lutravus halli n. gen. and n. sp.

Type—No. 478 C. I. T. Vert. Pale. Coll., an anterior portion of a skull with superior teeth represented, except the incisors and first premolars. The type is named for Dr. E. Raymond Hall in recognition of his important studies of Recent and fossil Mustelidæ.

Referred specimen—No. 643, C. I. T. Vert. Pale. Coll., a posterior fragment of the right ramus with $P\overline{4}$, $M\overline{1}$ and the alveolus for $M\overline{2}$.

Locality—Thousand Creek beds yielding remains of *Hipparion, Sphenophalos* and *Hypolagus,* approximately one mile west of the Hot Spring in

Thousand Creek flats; C. I. T. Coll. Loc. 63. The type occurred in a light buff-colored, fine sand. The paratype was found nearby in the same horizon, but represents a second individual.

Generic diagnosis—Dental formula $\frac{3}{3?}, \frac{1}{1?}, \frac{4}{3}, \frac{1}{2}$. Superior dentition: Teeth more robust and canine less curved than in *Lutra*. Diastema between third incisor and canine short. P1 farther removed behind canine than in *Lutra*. P2 and P3 with single cusp, not basined posteriorly. P4 with protocone narrow anteroposteriorly and situated well posterior to paracone root. M1 rectangular, not subquadrate, and with only slight posterior expansion of heel. Inferior dentition: P4 robust, situated close to M1, and with apex of principal cusp inclined posteriorly. Posterior heel absent and cingulum not well developed. M1 narrow with trigonid elongate and with short talonid. Metaconid small and postero-internal to protoconid.

Specific diagnosis—Superior and inferior teeth robust. Upper carnassial and Molar 1 more like comparable teeth in European *Lutra lutra* than like those of *Lutra canadensis pacifica*. P4 with inner basin behind protocone small, root of protocone posterior. M1 rectangular. M1 lacks the characteristic widening of the trigonid region seen in modern otters and the metaconid is small.

COMPARISONS

Superior Dentition

Lutravus differs from *Lutra lutra* Linnæus, *Lutra canadensis pacifica* Rhoads, the Pleistocene *L. palæindica* and other Lutrinæ in details of its dentition. In some characters the teeth are like those in *Brachypsalis* and in *Martes*. The molars have been reduced to M1 as in the more specialized *Lutra*, but P1 was probably not so reduced. The carnassial is more generalized and approaches the *Brachypsalis* type of tooth.

The alveoli for the incisors show that these teeth were deeply rooted and increased in size from I1 to I3. The third incisor was apparently a larger, heavier tooth than in *Lutra*, approaching in relative size that in *Gulo*.

The crown of the canine is long and exhibits a curvature less than that in *Lutra*.

The alveolus for P1 indicates a peg-like, single-rooted tooth. The socket is situated slightly farther behind the canine and more in alignment with the principal axis of the tooth-row than in *Lutra*.

The second premolar is relatively heavy with two roots and a crown with a single cusp. The latter cusp is high, with apex slightly anterior to the margin of the posterior root. The tooth widens posteriorly at the cingulum but is not basined as in *L. canadensis pacifica* (Plate 1, fig. 8) or in *L. lutra* (Plate 1, fig. 2).

P3 is double-rooted with robust crown. The principal cusp is likewise heavy, more so than in *L. canadensis pacifica* or *L. lutra*. An internal cingulum rises into a definite buttress at the base of the cusp and continues as a ridge which extends toward the apex. This tooth is broader posteriorly than in *Lutra lutra* but its breadth is relatively not so great as in *L. canadensis pacifica*. A posterior basin present in P3 of *L. lutra* and *L. canadensis pacifica* is absent in *Lutravus*.

P4 is a strongly developed, trigonal, sectorial tooth. The position of the protoconal root is well posterior to the paraconal root, more so than in *L. lutra* and *L. canadensis pacifica*. The position is more as in *Mephitis occidentalis occidentalis* and is not anterior to the paraconal root as in *Brachypsalis*.

The protocone is represented by a sharp secant blade as in *Lutra,* not by a rounded blunt cusp as in *Mephitis* or in *Brachypsalis.* The post-protoconal ledge does not form a broad, deep basin as in *L. lutra, L. palœindica* or *L. canadensis pacifica.* The border of this ledge extends to the medial base of the paracone and metacone, terminating at a point more anteriorly situated than in *L. canadensis pacifica* or in *Mephitis.* The configuration of the inner border of this tooth conforms more with that seen in *L. lutra,* but in *Lutravus* the postprotoconal ledge is not so broadly basined. Greater resemblance prevails between *Lutravus* and *L. lutra* than between the former type and *L. canadensis pacifica,* although in the European otter the inner ledge is more broadly basined and the emargination is rounded. In *L. canadensis pacifica* and in *L. palœindica* the transverse broadening of the inner basin extends much farther back along the base of the metacone than in the Thousand Creek type.

The anterior border of the base of the paracone in *Lutravus* does not form a shelf or cuspule so distinct as in the modern representatives of *Lutra* or in *L. palœindica.* The apex of the paracone is situated at a point transversely opposite the protocone and not well posterior to this cusp as in *Brachypsalis.* In *L. palœindica* and in *L. lutra* the position is slightly posterior to the protocone. The metacone is relatively low and the buccal surface is deeply beveled in back of the paracone as in *Lutra* and in *Mephitis.*

M1 resembles the comparable tooth in *Martes martes* in its rectangular form, as well as that of *Brachypsalis* in some characters. It differs distinctly in shape from the sub-quadrate form of tooth found in *Lutra* and in *Mephitis,* and from the semiquadrate type of tooth occurring in *B. pristinus.* In size and in proportions of crown, M1 approaches more closely *L. lutra* than it does either *L. canadensis pacifica* or *L. palœindica.*

The paracone and metacone form a distinct antero-posterior ridge set well in from the buccal cingulum. The two cusps are not so deeply separated as in *L. canadensis pacifica, L. lutra* or in *Brachypsalis.* The outer surface of the tooth slopes gently downward from the cingulum to the occlusal edge, whereas in *Brachypsalis* it is steep-sided. In *L. lutra* the outer wall is depressed inward or basined.

The protocone appears as a low crescentic edge rising from the shelf-like transversely elongate lingual third of the tooth. This protoconal ridge extends forward and outward to coalesce with the cingulum at the anterior base of the parastyle. In *Brachypsalis* the protocone is cusp-like and tends to be isolated from the paracone and cingulum. The protocone in *L. lutra* is more widely crescentic and is situated close to the lingual margin of the tooth. In *L. canadensis pacifica* it is a high cuspate ridge that forms the antero-inner face of the tooth. In *L. palœindica* M1 is lobate in form and the protocone is lateral and anterior to and connects with a rather prominent hypocone.

No distinct hypocone is present. The tooth is expanded in its postero-lingual part to form a shelf-like surface, but is not basined as in *L. lutra, L. canadensis pacifica* or in *Brachypsalis.* The inner border is not emarginate nor does it form a relatively high sharp edge as in *Lutra* and *Brachypsalis.* The inner surface is smoothly rounded in one plane and extends antero-posteriorly from a point in front of the protocone to the expanded postero-lingual portion of the tooth.

In occlusal aspect M1 presents a straight, transverse anterior border and an anteriorly concave posterior border, while in *Brachypsalis modicus* and *B. matutinus* the characters of these borders are reversed. M1 in *B. pristinus* is more quadrate as in *L. canadensis pacifica.* The inner half of M1 in *Lutravus* with its somewhat expanded hypoconal heel is not unlike the corresponding part of M1 in *Martes martes.*

Lutravus is smaller than *L. aonychoides* described by Zdansky from the Hipparion beds of China, and is closer in this respect to *L. lutra.* The superior teeth in *L. aonychoides* approximate in size and character those of *L. canadensis pacifica.* P4 has the anteroposterior expansion of the lingual shelf as in the true otters. M1 is subquadrate, the protocone more roundly cuspate than in *Lutravus,* and the heel is widely expanded. I3 is relatively large, the diastema intervening between the tooth and the canine longer than in *Lutravus,* and the canine inclined more anteriorly than in other lutrine species.

The angle formed by an intersection of the axes parallel to the external surfaces of P4 and M1 measures 151° in *Lutravus.* This angle is greater than that measured in *L. lutra* (141°) or in *L. palæindica* (136°) and approaches closely that in *Martes martes* (150°).

Comparative Measurements (in millimeters) of Dentition

	Lutravus C.I.T. No. 478	L. lutra C.I.T. No. 625	L. c. pacifica Dickey Col. No. 18136
Length of tooth row, anterior margin of C to posterior margin of M1	39.4	32.4	38.7
Transverse diameter measured between outer surfaces of first upper molars	15.8	11.5	14.2
C, greatest transverse diameter	5.5	4.8	5.4
C, greatest long diameter	7.3	5.2	6.6
P2, greatest long diameter	5.6	5.0	4.6
P2, greatest transverse diameter	3.7	3.2	3.3
P3, greatest long diameter	7.2	6.4	7.4
P3, greatest transverse diameter	4.5	4.2	4.5
P4, greatest long diameter	11.4	9.8	11.8
P4, greatest transverse diameter	7.9	7.0	8.0
M1, greatest long diameter	6.4	6.7	8.7
M1, greatest transverse diameter	10.6	9.7	11.0

Inferior Dentition

A fragment of the right ramus, No. 643 C.I.T., also from the Thousand Creek beds, is considered as belonging to *Lutravus halli.* In this specimen the dorso-ventral diameter of the jaw, the convexity of the inferior border and the crowding of the cheek-teeth indicate a shortening of the jaw. Presumably the anterior premolar teeth were somewhat reduced in size, with P1 absent. P4 is a single-cusped tooth resembling that in *Lutra lutra.* The cingulum is not so well developed and the tooth is broader posteriorly than in *L. lutra,* but the crown is not so broad or heeled as in *L. canadensis pacifica* (Plate 2, fig. 3). The principal cusp is heavier with the apex inclined backward, not vertical as in *L. lutra, L. canadensis pacifica,* or in *B. pristinus.* A posterior cuspule present in modern otters (Plate 2, fig. 2) and in *B. modicus* is absent in *Lutravus.*

MI is an elongate, relatively narrow tooth. The cingulum is less developed than in *L. lutra* or in *L. canadensis pacifica.* The anterior cusps rise gently to their apices from the cingulum which curves upward. In *L. lutra* and *L. canadensis pacifica* the cusps rise abruptly from a distinct ledge formed by the cingulum. The height of the crown is greater than in *Lutra.*

The protoconid is robust and the shearing blade is not deeply incised between this cusp and the paraconid. The paraconid is relatively narrow and is more in anteroposterior alignment with the protoconid. The metaconid is a much smaller cusp than in *Lutra lutra* or in *L. canadensis pacifica,* and it is more posterior in position and not so widely separated from the protoconid. The deep valley of the trigonid region, prominent in *L. lutra* and in *L. pacifica,* is not so evident in *Lutravus.* The talonid is small and not deeply basined. The anterior part of the tooth is much longer than the heel, while in *L. lutra* and in *L. canadensis pacifica* the heel is relatively much longer.

Although the type and referred specimen of *Lutravus halli* were not found in immediate association and doubtless belong to separate individuals, the occlusion of the cusps in P4, M1 and MI reveals an agreement which makes it seem probable, although not certain, that the two specimens belong to the same species.

Comparative Measurements (in millimeters) of MI

	Lutravus Referred Specimen C.I.T. No. 643	Lutravus Referred specimen U.C. No. 22463	L. lutra C.I.T. No. 625	L. lutra*	L.c. pacifica Dickey Coll.
Greatest length at cingulum...	14.0	13.8	12.4	13.7	14.0
Greatest width at cingulum...	5.7	6.0	5.6	6.9	7.7
Greatest length of trigonid....	9.3	9.8	7.0	6.8	7.1
Greatest length of talonid.....	4.1	4.3	5.4	6.8	5.7
Greatest width of trigonid.....	5.0	5.9	4.8	5.8	6.2
Greatest width of talonid.....	5.3	4.3	5.7	6.5	7.7

* Measurements from figured specimen, fig. 75, p. 360, G. S. Miller, *Catalogue of the Mammals of Western Europe,* 1912.

The lower teeth resemble in their characteristics the comparable teeth in otters, although, as may perhaps be expected, the lower dentition differs to a greater degree from that of the modern forms than does the upper dentition. Of minor importance but noteworthy nevertheless is the close agreement in size between Nos. 478 and 643.

In the occlusion of the lower and upper carnassials, the metaconid occupies the space between the protocone of P4 and the anterior border of M1 (Plate 2, fig. 7). The paraconid bites against the small basin of the protocone and the metaconid rests against the shelf encircling anteriorly the protocone of M1. The relatively small basin of the talonid in MI receives the protocone of M1, while the paracone and metacone in the latter tooth occlude perfectly with the slight grooves back of the protoconid on the outer margin of the hypoconid.

Although M2 is not present, the position and direction of the alveolus for the tooth indicate that the crown would presumably triturate against the narrow hypoconal heel of M1 (Plate 2, fig. 7).

The enamel of both the superior and inferior teeth is finely grooved, particularly on the outer surfaces of the sectorial teeth.

Skull

The palate presents an approximately flat surface (Plate 1, fig. 5), not concave medially as in *L. canadensis pacifica* (Plate 1, fig. 8), in which respect a closer resemblance is seen to *L. lutra* (Plate 1, fig. 2). The surface is broken posteriorly, but enough of the bone remains beyond the molars to indicate that the palate terminated as far back as in *L. canadensis pacifica*.

Numerous small foramina pierce the palate as in *Lutra* and in *Mephitis*. The anterior palatine foramina are long, lobate in form, and lie in the course of the grooves that pass anteriorly from small paired foramina for the sphenopalatine nerves and vessels which pierce the palate to the inner side of the third premolars. In *L. canadensis pacifica* the anterior palatine foramina are relatively larger and approximately circular, and the small foramina are situated between the anterior margins of the fourth premolars. In *L. lutra* the anterior palatine foramina are sub-circular and relatively larger than in *Lutravus*. The palate in the latter genus is proportionately longer, with an average greater width than in *L. canadensis pacifica* and in *L. lutra*.

Comparative Measurements (in millimeters) of Palate

	Lutravus C.I.T. No. 478	L. lutra*	L. lutra C.I.T. No. 625	L.c. pacifica Dickey Coll. No. 18136
Long diameter from line between posterior margin of last molars to posterior border of incisive alveoli	43.1	33.0	35.3	41.0
Transverse diameter between first molars	17.0	12.0	13.0	18.7
Transverse diameter between fourth premolars	19.4	15.2	12.6	16.3
Transverse diameter between second premolars	16.0	12.7	11.7	14.2
Transverse diameter between canines	14.0	13.5	13.8	15.5

* Measurements from figured specimen, fig. 74, p. 359, G. S. Miller, *Catalogue of the Mammals of Western Europe*, 1912.

The facial region (Plate 1, figs. 4, 6) exhibits characters of proportion that indicate less specialization resulting from a shortening and broadening of the muzzle and probably a greater dorsoventral diameter for the face. The maxillaries converge less abruptly toward the nasal suture line than in *L. lutra* (Plate 1, figs. 1, 3). In the maxillo-malar region the side of the face is higher than in modern forms, measuring 8.2 mm. from the edge of the alveolus of P4 to the ventral margin of the infraorbital foramen. Comparable measurements for *L. lutra* and *L. canadensis pacifica* are 4.0 mm. and 4.5 mm., respectively.

Length of the muzzle is evidenced by the distance between the anterior margin of the opening of the postpalatine canal and the lateral margin of the nasal opening; 26.2 mm. in *Lutravus*, 20.1 mm. in *L. lutra* and 20.4 mm. in *L. canadensis pacifica*.

The maxillaries are not so widely expanded over the canine roots. The transverse diameter of the skull measured between the ends of the canine roots (22.3 mm.) is considerably less than in *L. canadensis pacifica* (27.7 mm.) and slightly less than in *L. lutra* (23.8 mm.). The diameter between the infraorbital foramina in *Lutravus* is 30.0 mm., in *L. canadensis pacifica* 28.3 mm., hence the face is seen to narrow anteriorly more decidedly in the Pliocene genus than in the living American otter. The same dimensions in the European species are more uniform, being 23.8 mm. between the canine roots and 24.0 mm. between the infraorbital foramina.

Lutravus (Plate 1, fig. 6) has a narrow anterior nasal orifice as in *L. lutra*, (Plate 1, fig. 3), while that in *L. canadensis pacifica* (Plate 1, fig. 9) is wide. Other differences of proportion are noted in the premaxillary region. In *Lutravus* the alveolar border is shallow and recedes from the incisor margin to the floor of the nares rather abruptly, whereas in *L. lutra* and in *L. canadensis pacifica* the surface has greater vertical height above the incisor border. The lateral ascending parts of the premaxillaries are more pronounced and are not inclined posteriorly so abruptly. Deep depressions are present on the surfaces of these elements.

Viewed from in front (Plate 1, figs. 3, 6, 9) the infraorbital foramina of *L. lutra* and *L. canadensis pacifica* are partly obscured by a lateral expansion of the maxillaries in the region of the alveoli for the canines. The infraorbital foramina and maxillo-malar region are fully exposed in *Lutravus*.

Lutravus, probably halli Furlong

The mustelid specimen, No. 22463 U. C. Coll., figured and described by Merriam, Stock, and Moody,[1] from the Rattlesnake formation of Oregon, Univ. Calif. locality 3045, is structurally very similar to No. 643 (Plate 2, fig. 4) from Thousand Creek. It consists of a portion of the right ramus and is more complete anteriorly than the Thousand Creek specimen, for remnants of $P\overline{2}$ and $P\overline{3}$ are present. In preservation and degree of wear, $P\overline{4}$ and $M\overline{1}$ are similar to the comparable teeth in No. 643. Likewise, as in the latter, $M\overline{2}$ is represented only by its alveolus.

The length of the cheek-tooth series appears to be comparable to that in No. 643. In the latter the length of the last premolar and first molar measures 21.4 mm., while in No. 22463 this measurement is 21.1 mm. $P\overline{2}$ is a double-rooted tooth of small size as in *L. lutra*, and is closely placed between the canine and $P\overline{3}$.

$P\overline{4}$ is crowded against $M\overline{1}$ as in No. 643, with like development of cingulum and attitude of cusp.

The cusps in $M\overline{1}$ differ only in minor details from those of No. 643. The protoconid and paraconid occupy the same relative positions. The apex of the metaconid is low as in No. 643 and does not form with the paraconid and protoconid the perfect trigonid with deep valley as in *L. lutra* (Plate 2, fig. 2) and in *L. canadensis pacifica* (Plate 2, fig. 3). The hypoconid is slightly more cuspate, the cingular border of the talonid protuberant, while in No. 643 the talonid is emarginate with steeper outer wall. The entoconid is absent in both the Thousand Creek and Rattlesnake specimens. The minor discrepancies may be due to individual or sub-specific variation. The first lower molars in the Thousand Creek and Rattlesnake specimens accord well in proportionate dimensions.

[1] J. C. Merriam, Chester Stock, C. L. Moody, Carnegie Inst. Wash. Pub. No. 347, pp. 66, 67, fig. 18, 1925.

While the mental foramina are not to be noted in No. 643 because of incomplete preservation of the fore part of this specimen, the openings are clearly indicated in No. 22463. Certain characters can be noted from the latter. A large anterior mental foramen below $P\overline{2}$ and a small one below $P\overline{3}$ correspond to the foramina in *L. canadensis pacifica*. In the latter type the foramina have a position relatively farther posteriorly, the smaller one occurring below the anterior root of $P\overline{4}$. In *L. lutra* the foramina are not so widely spaced, the larger anterior one being situated below the anterior root

Comparative Measurements (in millimeters)

	Calif. Inst. Tech. No. 643	Univ. Calif. No. 22463
$M\overline{1}$, greatest length	14.0	13.8
$M\overline{1}$, transverse diameter	5.9	6.0
$M\overline{1}$, transverse diameter of trigonid	6.3	5.9
$M\overline{1}$, long diameter of trigonid	9.8	9.8
$M\overline{1}$, long diameter of talonid	4.0	4.3
$M\overline{1}$, height of crown at protoconid	8.0	7.5

of $P\overline{3}$ and the posterior foramen occurring as in *L. c. pacifica*. In *Lutravus*, specimen No. 643, the broken surface just anterior to the anterior root of $P\overline{4}$, shows a small canal, suggesting that the posterior mental foramen occupied a position anterior to $P\overline{4}$ and similar to that in Univ. Calif. No. 22463.

The anterior margin of the masseteric fossa in *Lutravus*, Nos. 643 and 22463, terminates farther forward than in *L. c. pacifica* or in *L. lutra*. The

Comparative Measurements (in millimeters) of Right Ramus

	Lutravus C.I.T. No. 643	Lutravus U.C. No. 22463	L. lutra*	L. lutra C.I.T. No. 625	L.c. pacifica Dickey Coll. No. 18136
Dorsoventral diameter of ramus at $M\overline{1}$	15.0	13.9	10.2	10.4	13.0
Transverse diameter at $M\overline{1}$	7.5	6.7	....	7.2	6.9

* Measurement from figured specimen, fig. 72, p. 357, G. S. Miller, ***Catalogue of the Mammals of Western Europe***, 1912.

ascending border of the coronoid process in Nos. 643 and 22463 is inclined dorsally more gradually than in *L. lutra* or in *L. c. pacifica*. In the latter species the ascending part rises abruptly above the horizontal ramus posterior to $M\overline{2}$.

The ramus is somewhat convex ventrally below $M\overline{1}$ and $P\overline{4}$ and assumes a more even plane anterior to $P\overline{4}$ in the symphyseal region. This type of ventral border is seen in Nos. 643 and 22463. In *L. lutra* the convexity is less pronounced and in *L. c. pacifica* the ventral border of the entire ramus is continuously convex from symphysis to angle.

Relationships

The characters displayed in the superior and inferior dentition as well as by the skull of *Lutravus* clearly represent a stage in the phylogenetic development of the Lutrinæ earlier than that of the genus *Lutra*. The characters noted especially in the upper and lower carnassials and in $M\underline{1}$ are distinctly less advanced than in modern representatives of the otter group. It is interesting to note that in a number of features, as for example in $P\underline{4}$ and $M\underline{1}$, *Lutravus* is more like the Quaternary European species *Lutra lutra* than like the Recent North American species *L. canadensis*. Perhaps the most striking of the more generalized characters to be seen in *Lutravus* relate to $M\underline{1}$. This tooth differs from that in *Lutra* and in *Mephitis* in the more forwardly directed blade of the paraconid and in the posterior position of the metaconid. In these features greater resemblance prevails with *Meles meles, Martes martes* and *Mustela*.

Were it ultimately shown that the two specimens, on which the genus *Lutravus* is based, represent two distinct genera of mustelids rather than one and the same species the absence of more distinctive lutrine characters in $M\underline{1}$ of No. 643 may indicate a relationship between this specimen and *Sthenictis*.

Largely because of the fragmentary nature of the remains, the otters described from the European Miocene and Pliocene with the possible exception of *Pothamotherium*, are of uncertain generic status. On the other hand, at least two Quaternary and late Tertiary species of the Old World, namely *Lutra lutra* and *L. palæindica*, appear to be definitely established. Among the fossil forms recorded from North America, the type of *Lutravus* is now known also from the Rattlesnake Pliocene of the John Day basin, Oregon. The presence of this species in the Thousand Creek and Rattlesnake furnishes incidentally further evidence of the close relationship of these two faunas, already indicated by presence of identical or nearly related species of *Hipparion* and *Sphenophalos*.

The structural characters exhibited by *Lutravus* and the position of this genus in the later Tertiary of western North America obviates the possibility of deriving the form definitely from some specific member of the more generalized mustelids of the earlier Tertiary. Certain it is that more information is needed concerning the Miocene representatives of the group.

Plate 1

All figures natural size.

Figs. 1, 2, 3—*Lutra lutra* Linnæus. C.I.T. No. 625, Recent, England. Lateral, ventral and anterior views of skull.

Figs. 4, 5. 6—*Lutravus halli* n. gen. and n. sp. Type C.I.T. No. 478, Thousand Creek Pliocene, Nevada. Lateral, ventral and anterior views of skull.

Figs. 7, 8, 9—*Lutra canadensis pacifica* Rhoads. Dickey Coll. No. 18136, Oregon. Lateral, ventral and anterior views of skull.

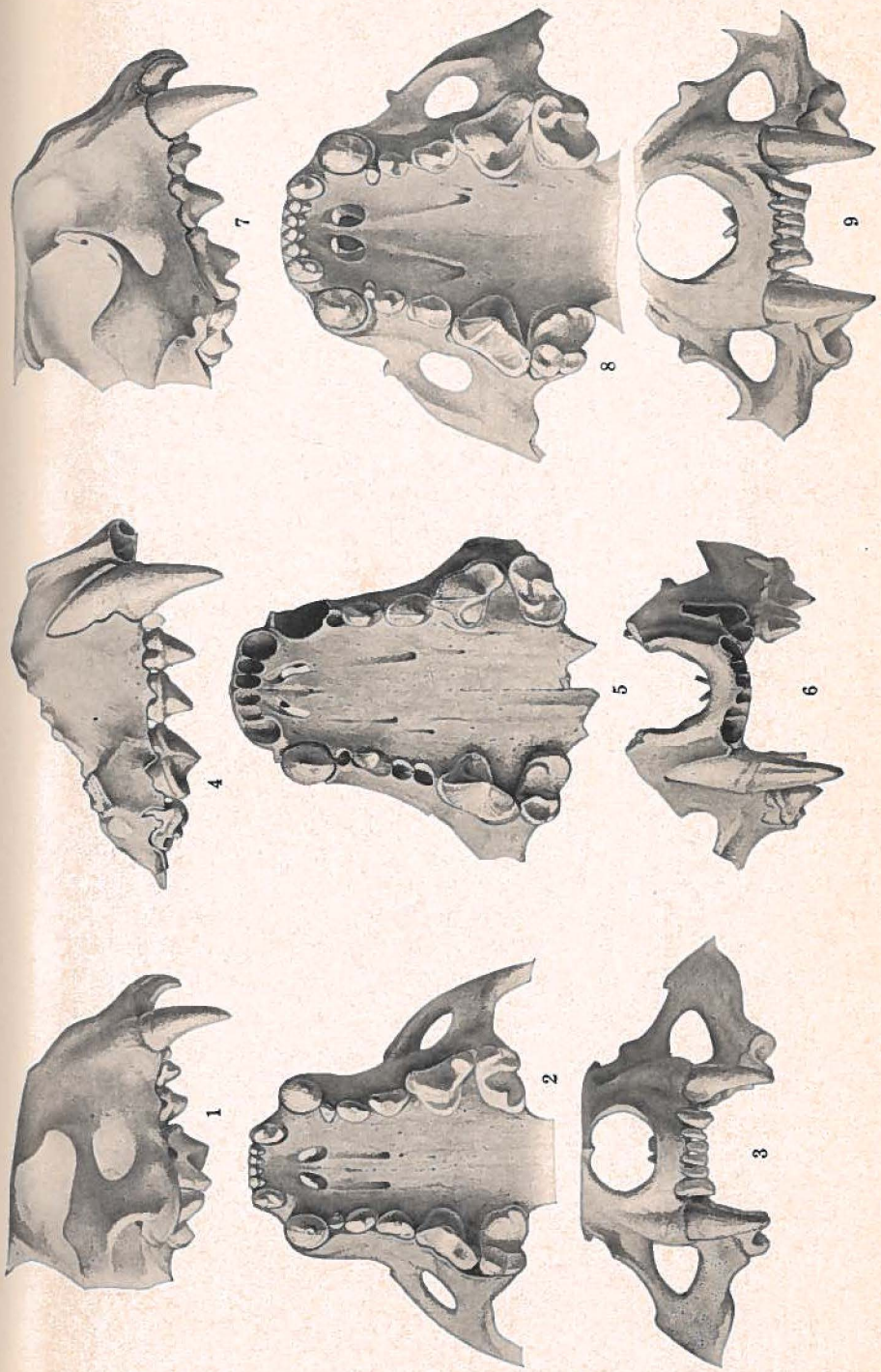
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Plate 2

All figures natural size.

Fig. 1—*Lutravus*, probably *halli* Furlong. Univ. Calif. No. 22463, Rattlesnake Pliocene, Oregon. Lateral and dorsal views of ramus.

Fig. 2—*Lutra lutra* Linnæus. C.I.T. No. 625, Recent, England. Lateral and dorsal views of ramus.

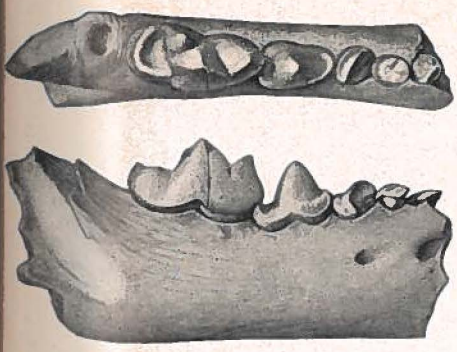
Fig. 3—*Lutra canadensis pacifica* Rhoads. Dickey Coll. No. 18136, Recent, Oregon. Dorsal and lateral views of ramus.

Fig. 4—*Lutravus halli* n. gen. and n. sp. Referred specimen, C.I.T. No. 643, Thousand Creek Pliocene, Nevada. Dorsal and lateral views of ramus.

Fig. 5—*Lutravus halli* n. gen. and n. sp. C.I.T. Nos. 478-643, Thousand Creek Pliocene, Nevada. Outer view of inferior and superior teeth in occlusion.

Fig. 6—*Lutravus halli* n. gen. and n. sp. C.I.T. Nos. 478-643, Thousand Creek Pliocene, Nevada. Inner view of inferior and superior teeth in occlusion.

Fig. 7—Diagram showing relationships of cusps in MI, $M\overline{2}$, $P\underline{4}$ and $M\underline{1}$ of *Lutravus* when teeth occlude, 1 Paraconid, 2 Protoconid, 3 Hypoconid, 4 Metaconid. Position of metaconid should be farther forward than indicated.



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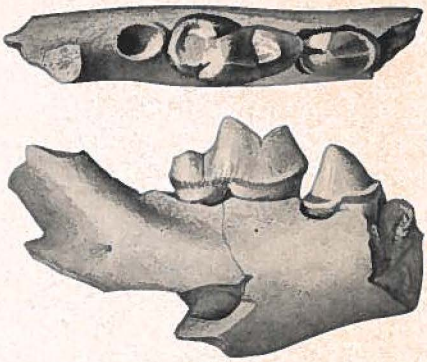

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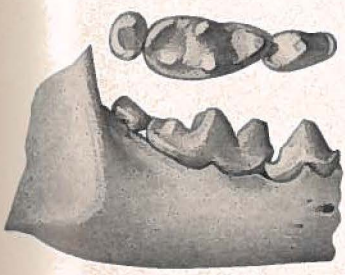

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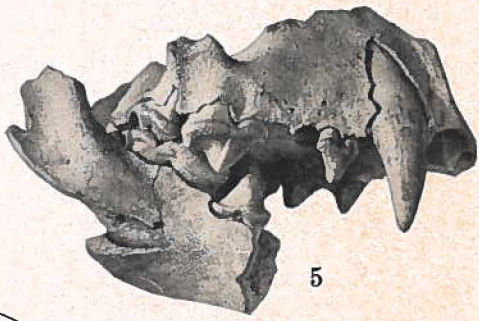

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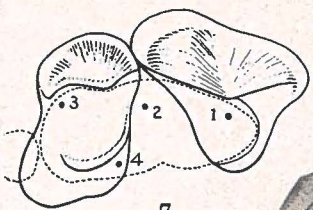

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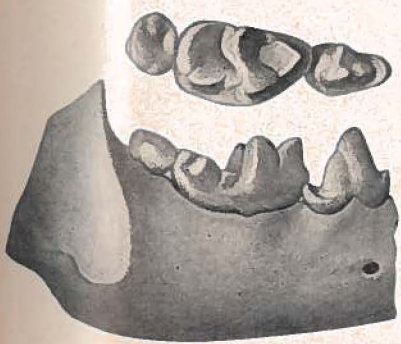

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